AD-A103 500 NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON --ETC F/G 13/13
NATIONAL DAM SAFETY PROGRAM. UPPER MOHAWK LAKE DAM (NJ00292), D--ETC(U)
JUL 81 R J MCDERMOTT, J E GRIBBIN DACW61-79-C-0011
UNCLASSIFIED DAEN/NAP-53842/NJ00292-81/ NL

1 OF 1
AD A
103500

END
DATE FILMED
10-81
DTIC

LEVEL II

DELAWARE RIVER BASIN
TRIBUTARY TO PAULINS KILL RIVER
SUSSEX COUNTY
NEW JERSEY

UPPER MOHAWK LAKE DAM

NJ00292

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

DEPARTMENT OF THE ARMY
Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

JULY 1981

REPT. NO: DAEN/NAP-53842/NJ00292-81/07

National Dam Safety Program. Upper Mohawk Lake Dam (NJ00292), Delaware River Basin, Tributary to Paulins Kill River, Sussex County, New Jersey. Phase I Inspection Report.

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
DAEN/NAP-53842/NJ00292-81/07	AD-A103 500	

4. TITLE (and Subtitle)
Phase I Inspection Report
National Dam Safety Program
Upper Mohawk Lake Dam, NJ00292
Sussex County, New Jersey

5. TYPE OF REPORT & PERIOD COVERED
FINAL

6. PERFORMING ORG. REPORT NUMBER

7. AUTHOR(s)
McDermott, Richard J., P.E.
Gribbin, John E., P.E.

8. CONTRACT OR GRANT NUMBER(s)
DACW61-79-C-0011

9. PERFORMING ORGANIZATION NAME AND ADDRESS
Storch Engineers
220 Ridgedale Ave.
Florham Park, N.J. 07932

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS

11. CONTROLLING OFFICE NAME AND ADDRESS
NJ Department of Environmental Protection
Division of Water Resources
P.O. Box CN029
Trenton, NJ 08625

12. REPORT DATE
July, 1981

13. NUMBER OF PAGES
50

14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)
U.S. Army Engineer District, Philadelphia
Custom House, 2d & Chestnut Streets
Philadelphia, PA 19106

15. SECURITY CLASS. (of this report)
Unclassified

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)
Approved for public release; distribution unlimited.

Accession For
NTIS GRA&I
DTIC TAB
Unannounced
Justification
By
Distribution/
Availability Codes
Dist Special
A

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES
Copies are obtainable from National Technical Information Service, Springfield, Virginia 22151.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dams	National Dam Safety Program
Embankments	Upper Mohawk Lake Dam, N.J.
Visual Inspection	Spillways
Structural Analysis	Seepage

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)
This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

412524

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE—2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO

NAPEN-N

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

31 JUL 1981

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Upper Mohawk Lake Dam in Sussex County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Upper Mohawk Lake Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in good overall condition and the spillway is considered adequate. To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. Within one year from the date of approval of this report the owner should engage a qualified professional consultant to perform the following:

(1) The observed seepage should be monitored on a periodic basis in order to detect any changes in condition.

(2) The ability to drain the lake should be investigated. If the need for a low level outlet is determined, a suitable outlet should be designed and installed.

b. Within one year from the date of approval of this report the following remedial actions should be initiated:

(1) The trash rack at the downstream end of the spillway discharge flume should be reinforced or replaced.

(2) Trees on the embankment should be investigated to assess their detrimental effect on the dam and those found to be adverse should be removed.

(3) The upstream face and crest of the dam should be properly stabilized.

c. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam, within one year from the date of approval of this report.

d. An emergency action plan should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Courter of the Thirteenth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

An important aspect of the Dam Inspection Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,

ROGER L. BALDWIN
Lieutenant Colonel, Corps of Engineers
Commander and District Engineer

1 Incl
As stated

Copies furnished:
Mr. Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

Mr. John O'Dowd, Acting Chief
Bureau of Flood Plain Regulation
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

UPPER MOHAWK LAKE DAM (NJ00292)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 29 January 1981 by Storch Engineers, under contract to the State of New Jersey. The State, under agreement with the U.S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

Upper Mohawk Lake Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in good overall condition and the spillway is considered adequate. To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. Within one year from the date of approval of this report the owner should engage a qualified professional consultant to perform the following:

(1) The observed seepage should be monitored on a periodic basis in order to detect any changes in condition.

(2) The ability to drain the lake should be investigated. If the need for a low level outlet is determined, a suitable outlet should be designed and installed.

b. Within one year from the date of approval of this report the following remedial actions should be initiated:

(1) The trash rack at the downstream end of the spillway discharge flume should be reinforced or replaced.

(2) Trees on the embankment should be investigated to assess their detrimental effect on the dam and those found to be adverse should be removed.

(3) The upstream face and crest of the dam should be properly stabilized.

c. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam, within one year from the date of approval of this report.

d. An emergency action plan should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

APPROVED: Roger Baldwin

ROGER L. BALDWIN
Lieutenant Colonel, Corps of Engineers
Commander and District Engineer

DATE: 31 July 81

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Upper Mohawk Lake Dam, NJ00292
State Located:	New Jersey
County Located:	Sussex
Drainage Basin:	Delaware River
Stream:	Tributary to Paulins Kill River
Dates of Inspection:	January 29, 1981

Assessment of General Condition of Dam

Based on available records, past operational performance, visual inspections and Phase I engineering analysis, Upper Mohawk Lake Dam is assessed as being in good overall condition.

Based on investigations of the downstream flood plain made in connection with this report, it is recommended that the hazard potential classification be downgraded from high to significant hazard.

The spillway is capable of passing the designated spillway design flood (100-year storm) without an overtopping of the dam and, therefore, is assessed as being adequate.

It is recommended that the following remedial measures be undertaken by the owner in the future:

1) The trash rack at the downstream end of the spillway discharge flume should be reinforced or replaced.

2) Some trees on the embankment appeared to have been planted for aesthetic purposes while others appeared to be randomly located. Therefore, trees on the embankment should be investigated to assess their detrimental effect on the dam and those found to be adverse should be removed.

3) The upstream face and crest of dam should be properly stabilized.

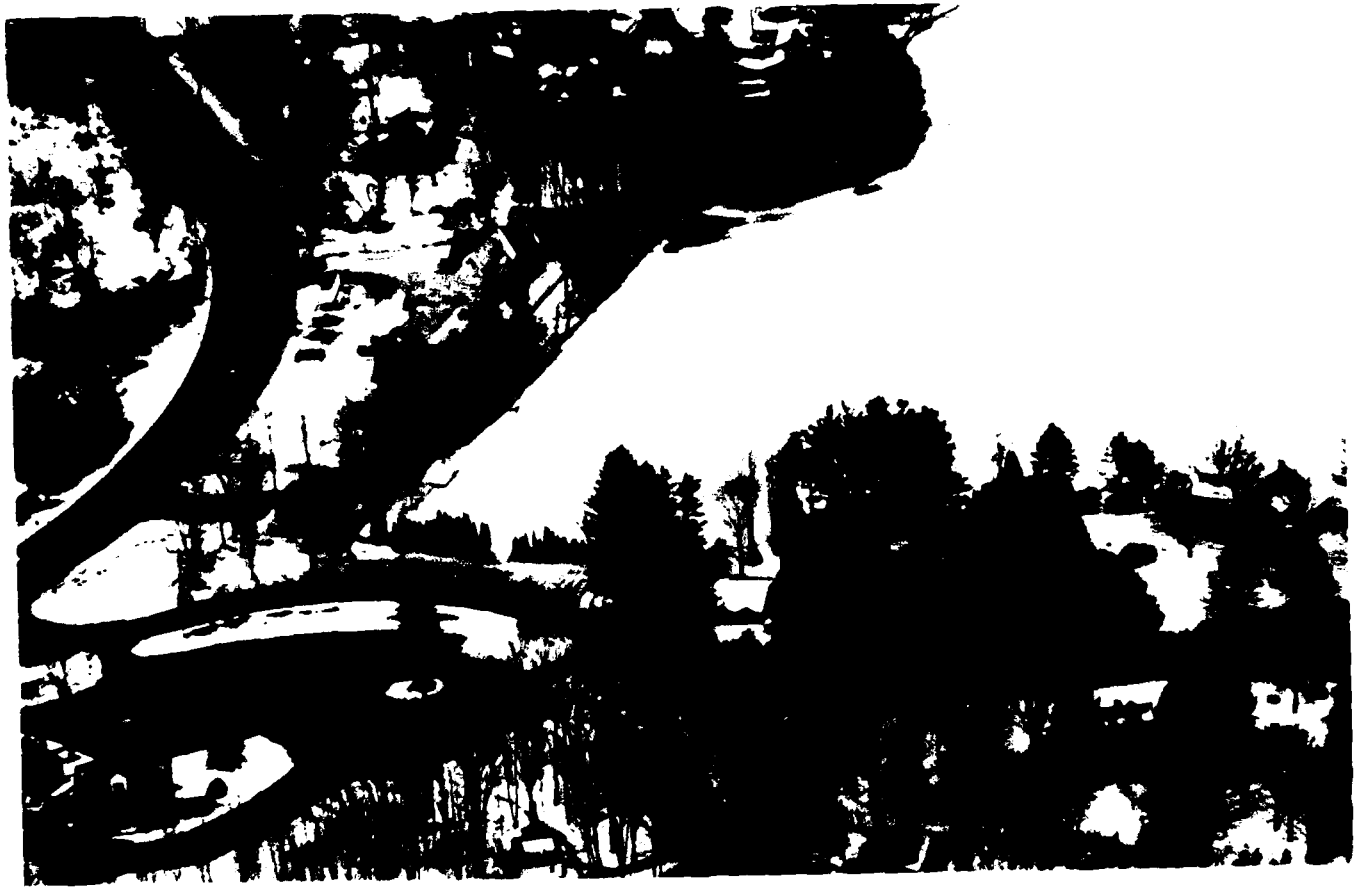
4) The ability to drain the lake should be investigated by an engineer experienced in the design and construction of dams. If the need for a low level outlet is determined, a suitable outlet should be designed and installed.

The observed seepage should be monitored on a periodic basis by a professional engineer experienced in the design and construction of dams in order to detect any changes in condition.

In the future, the owner of the dam should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

Richard J. McDermott, P.E.

John E. Gribbin, P.E.



OVERVIEW - UPPER MOHAWK LAKE DAM

20 JANUARY 1981

TABLE OF CONTENTS

TABLE OF CONTENTS (cont.)

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that the unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydraulic and hydrologic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydraulic and hydrologic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

UPPER MOHAWK LAKE DAM, I.D. NJ00292

SECTION 1: PROJECT INFORMATION

1.1 General

a. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The Division of Water Resources of the New Jersey Department of Environmental Protection (NJDEP) in cooperation with the Philadelphia District of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the State of New Jersey. Storch Engineers has been retained by the NJDEP to inspect and report on a selected group of these dams. The NJDEP is under agreement with the Philadelphia District of the Corps of Engineers.

b. Purpose of Inspection

The visual inspection of Upper Mohawk Lake Dam was made on January 29, 1981. The purpose of the inspection was to make a general assessment of the structural integrity and operational adequacy of the dam structure and its appurtenances.

1.2 Description of Project

a. Description of Dam and Appurtenances

The dam consists of an earth embankment with a two-stage spillway near the left end. The spillway consists of a concrete notched weir with a timber slide gate fitted in the notch in the center of the weir. The downstream side of the spillway discharges onto a concrete flume and then into a 36-inch reinforced concrete pipe.

The elevations of the primary and secondary stages of the spillway are 804.0 and 804.9, respectively, National Geodetic Vertical Datum (N.G.V.D.) while the lengths of the primary and secondary stages are 4.3 feet and 11.0 feet respectively. The crest of the dam is at elevation 806.1 and the invert elevation of the intake end of the 36" R.C.P. is 789.8. The overall length of the dam is 440 feet and its height is 16.3 feet.

b. Location

Upper Mohawk Lake Dam is located in the Township of Sparta, Sussex County, New Jersey. Access to the dam is from Newton-Sparta Road which is located parallel to the dam about 100 feet downstream. Discharge from the spillway of the dam flows into a tributary to the Paulins Kill River.

c. Size and Hazard Classification

The dam is classified in accordance with criteria presented in "Recommended Guidelines for Safety Inspection of Dams" published by the U.S. Army Corps of Engineers. Size categories consist of Small, Intermediate and Large while hazard categories are designated as Low, Significant and High.

Size Classification: Upper Mohawk Lake Dam is classified as "Small" size since its maximum storage volume is 142 acre-feet (which is less than 1000 acre-feet) and its height is 16.3 feet (which is less than 40 feet).

Hazard Classification: Visual inspection of the downstream flood plain of the dam indicates that failure of the dam due to overtopping could result in damage to a public road (Newton-Sparta Road) located 100 feet from the dam and minor damage to a commercial building located along the toe of the dam. However, failure would not be likely to inundate a dwelling located about 300 feet downstream from the dam. Loss of more than a few lives is not anticipated. Accordingly, Upper Mohawk Lake Dam is classified as "Significant" hazard.

d. Ownership

Upper Mohawk Lake Dam is privately owned by the Lake Mohawk Country Club, 21 The Boardwalk, Sparta, New Jersey 07871.

e. Purpose of Dam

The purpose of the dam is the impoundment of a lake used for recreation.

f. Design and Construction History

Upper Mohawk Lake Dam reportedly was constructed in or about 1927. In 1970 a new outlet structure was constructed.

g. Normal Operational Procedures

Reportedly, the lake level is not drawn down for lake maintenance purposes or to augment spillway capacity.

The dam and its appurtenances are repaired on an "as needed" basis.

1.3 Pertinent Data

a.	Drainage Area	0.19 square miles
b.	Discharge at Damsite	
	Maximum flood at damsite	Unknown
	Outlet Works at pool elevation	N.A.
	Spillway capacity at top of dam	65 cfs
c.	Elevation (N.G.V.D.)	
	Top of Dam	806.1
	Maximum pool-design surcharge	805.7
	Spillway crest - Primary	804.0
	- Secondary	804.9
	Stream bed at toe of dam	789.8
	Maximum tailwater	791 (Estimated)
d.	Reservoir	
	Length of maximum pool	2000 feet (Estimated)
	Length of recreation pool	1700 feet (Scaled)
e.	Storage (Acre-feet)	
	Recreation pool	100
	Design surcharge	134
	Top of dam	142

f. Reservoir Surface (acres)

Top of dam	21 (Estimated)
Maximum pool - design surcharge	20.5 (Estimated)
Recreation pool	20.0

g. Dam

Type	Earthfill
Length	440 feet
Height	16.3 feet
Sideslopes - Upstream	1 horiz. to 1 vert.
- Downstream	2 horiz. to 1 vert.
Zoning	Unknown
Impervious core	Unknown
Cutoff	Unknown
Grout curtain	Unknown

h. Diversion and Regulating Tunnel — N.A.

i. Spillway

Type	Broad Crested Weir
Width	1.5 feet
Crest elevation - Primary	804.0
- Secondary	804.9
Invert elevation (Discharge Culvert)	789.8
Gates	Timber Slide Gate 4.3' long
Approach channel	N.A.
Discharge channel	Spillway discharges onto concrete flume and then into 36-inch culvert

j. Regulating Outlet

None known

SECTION 2: ENGINEERING DATA

2.1 Design

A construction drawing titled "Suggested Arrangement of Cutoff Wall with the Use of Jones and Loughin Steel Piling" dated January 1, 1930 is available at Mohawk Lake Country Club. The drawing indicates that a concrete corewall is located along the dam for a length of 125 feet and that steel sheet piling is located in the embankment upstream from the corewall. The sheeting reaches a maximum depth of approximately 50 feet below the dam crest Also site plans for a commercial building constructed adjacent to the toe of dam is available at Architecture Partnership of Sparta, N.J. No plans could be found pertaining to the 1970 construction of the new outlet structure.

2.2 Construction

No data or reports pertaining to the construction of the dam are available.

2.3 Operation

No data or reports pertaining to the operations of the dam are available.

2.4 Evaluation

a. Availability

There is no available engineering data pertaining to the original construction of the dam.

b. Adequacy

Available engineering data pertaining to Upper Mohawk Lake Dam is of limited assistance in the performance of a Phase I evaluation. A list of absent information is included in paragraph 7.1.b.

c. Validity

The datum used on the construction drawing of 1930 is in general agreement with N.G.V.D. and was used as datum for this report. Remaining engineering data could not be verified for validity.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General

The inspection of Upper Mohawk Lake Dam was performed on January 29, 1981 by staff members of Storch Engineers. A copy of the visual inspection check list is contained in Appendix 1. The following procedures were employed for the inspection:

1) The embankment of the dam, appurtenant structures and adjacent areas were examined.
2) The embankment and accessible appurtenant structures were measured and key elevations determined by surveyor's level.
3) The embankment, appurtenant structures and adjacent areas were photographed.
4) The downstream flood plain was toured to evaluate downstream development and restricting structures.

b. Dam

The embankment crest was generally grass covered with a pedestrian path running down the center. The material on the surface appeared to be sand. Trees were growing on the upstream and downstream sides and ranged in size from 8 inches to 18 inches. The upstream face above the waterline was protected by logs held in place by pipes. The log slope protection was slumping in places and appeared to be in somewhat deteriorated condition. There was evidence of a small amount of riprap, but it appeared to be inadequate. Fill appeared to have been placed along the downstream toe of the right portion of the dam. The fill was in connection with a commercial building under construction adjacent to the toe of dam. The placement

of fill had resulted in an embankment height of 2 to 3 feet for that portion of the dam to the right of the spillway. Trees along that portion of the embankment appeared to have been planted for aesthetic purposes. An area of erosion was observed on the downstream face of the embankment to the right of the spillway. It appeared to be a result of pedestrian activity.

c. Appurtenant Structures

The spillway consisted of a notched concrete weir. The downstream side of the spillway consisted of a fairly roughly poured concrete flume on the downstream side of the dam. At the downstream end of the flume the entrance to a reinforced concrete pipe was observed. The pipe ran under a parking area which was under construction. It then ran under Newton-Sparta Road and emerged on the other side. The concrete surfaces forming the spillway crest and abutments appeared to be in satisfactory condition. A few cracks were observed in the concrete forming the downstream flume although it appeared to be generally stable and in satisfactory condition. There was a timber slide gate at the notch in the center of the concrete weir. The gate together with its steel frame and lifting mechanism appeared to be in satisfactory condition. The steel frame and lifting mechanism appeared to be adequately protected by paint. There was a timber walkway across the spillway and it appeared to be in fair condition. A pipe railing on the downstream side of the walkway was in satisfactory condition. The entrance to the pipe below the spillway had a trash rack formed by six pipes embedded in the concrete. The pipes appeared to be new but they did not appear to be well embedded and could be loosened easily. There was no headwall at the entrance to the pipe but rather a flared end section. The slope around the entrance to the pipe was stabilized by large boulders which appeared to be well placed. The stabilization appeared to be satisfactory.

d. Seepage

A small amount of seepage and orange deposits were observed at the toe of the concrete spillway discharge flume. The seepage was flowing with a trickle and appeared to be emerging from a crack in the concrete. Orange deposits were also observed in the channel downstream from Newton-Sparta Road.

e. Downstream Channel

The spillway discharges directly into a concrete pipe under Newton-Sparta Road. The pipe emerges at the toe of a 12-foot high slope at a concrete headwall on the downstream side of Newton-Sparta Road. A small channel which is rock lined on its sides conveys the water from the pipe for a distance of approximately 50 feet to a small pond. There is a house located approximately 100 feet to the left of the pond at an elevation about equal to that of Newton-Sparta Road. The small channel leading into the pond has banks approximately 3 feet high and is approximately 4 feet wide.

f. Reservoir Area

The reservoir appeared to be completely surrounded by homesites. The homesites are accompanied by lake related structures at the shores, such as walls and docks. Most of the homesites are 10 to 15 feet above the water, with some at the upstream end that are approximately 3 to 4 feet above the water level. Most of the terrain slopes away from the lake at a 25 to 50 percent grade and is grassed with trees growing and a few rock outcroppings observed as well.

SECTION 4: OPERATIONAL PROCEDURES

4.1 Procedures

The level of water in Upper Mohawk Lake is regulated by discharge over the primary and secondary stages of the spillway. Reportedly, the lake level is not drawn down for lake maintenance purposes or to augment spillway capacity.

4.2 Maintenance of the Dam

Reportedly, regular maintenance of the dam is performed on an "as needed" basis. Maintenance is performed by the Lake Mohawk Country Club.

4.3 Maintenance of Operating Facilities

Reportedly, regular maintenance of operating facilities is performed on an "as needed" basis. Reportedly, the spillway was renovated in or about 1970.

4.4 Description of Warning System

Reportedly, no warning system is currently in use for the dam.

4.5 Evaluation of Operational Adequacy

The operation of the dam has been successful to the extent that the dam reportedly has not been overtopped. Trees on the crest appeared to have decorative purpose and would not have been removed in connection with a maintenance program.

Although maintenance documentation is poor, maintenance of the dam and operating facilities appears to have been generally adequate.

However, maintenance has not been adequate in the following areas:

1) Crest not stablized in area of pedestrian path.

2) Deteriorated stabilization on upstream face not repaired.

3) Erosion on downstream side of embankment on right side of spillway not repaired.

4) Trees and adverse vegetation on the embankment not removed.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design Data

The quantity of storm water runoff that the spillway should be able to handle is based on the size and hazard classification of the dam. This runoff quantity, called the spillway design flood (SDF) is described in terms of return frequency or Probable Maximum Flood (PMF) depending on the extent of the dam's size and potential hazard. According to the "Recommended Guidelines for Safety Inspection of Dams" published by the U.S. Army Corps of Engineers, the SDF for Upper Mohawk Lake Dam falls in a range of 100-year frequency to 1/2 PMF. In this case, the low end of the range, 100-year frequency, is chosen since the factors used to select size and hazard classification are on the low side of their respective ranges.

The SDF peak computed for Upper Mohawk Lake Dam (See Appendix 4) was calculated by the Soil Conservation Service Triangular Unit hydrograph method with the curvilinear transformation utilizing the HEC-1-DAM computer program.

General hydrologic characteristics used in this method were computed using USGS quadrangles. The drainage area contributing to the impoundment is 0.19 square miles. Most of the watershed is developed as a lake community. The SDF peak inflow was computed to be 316 c.f.s.

The spillway discharge rates were computed by the use of a weir formula appropriate for the configuration of the spillway. The total spillway discharge with lake level equal to the top of the dam was computed to be 65 c.f.s. The SDF was routed through the dam by use of the HEC-1-DAM computer program using the modified Puls Method. In routing the SDF, it was found

that the dam crest would not be overtopped. Accordingly, the subject spillway is assessed as being adequate in accordance with criteria developed by the U.S. Army Corps of Engineers.

b. Experience Data

Reportedly, the subject dam has not experienced overtopping.

c. Visual Observation

At the time of the field inspection, no evidence of overtopping was observed.

d. Overtopping Potential

According to the hydrologic and hydraulic analyses, a storm of intensity equivalent to the SDF will pass through the spillway with a minimum freeboard of 0.2 feet.

e. Drawdown Time

Drawdown time for the subject dam cannot be computed due to the absence of an outlet works.

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

The dam appeared at the time of inspection to be outwardly structurally sound. Seepage was observed at the downstream toe of the concrete flume at the discharge culvert. The observed seepage however, did not appear to be an indication of immediate structural instability.

b. Generalized Soils Description

The configuration of the Upper Mohawk Lake Dam site consists of glacial kames composed of stratified material, silty sand and gravel accumulated during the Wisconsin glacial period.

The kames are surrounded by a formation of ground moraine, a shallow mantle of unconsolidated and unstratified materials deposited during the Wisconsin glacial stage overlying Byram gneissic bedrock as shown on the Geologic Map of New Jersey

c. Design and Construction Data

Analysis of structural stability and construction data for the embankment are not available.

d. Operating Records

No operating records are available for the dam. The water level of Upper Mohawk Lake is not monitored.

e. Post-Construction Changes

In 1970 reportedly, a new outlet structure was constructed. Reportedly, the lake was dredged during the year 1972. At the time of inspection, it was noted that fill had been placed along the toe of dam to the right of the spillway to a level approximately 2 feet to 3 feet below the dam crest. The fill was placed in connection with a commercial site development, under construction at the time of inspection.

f. Seismic Stability

Upper Mohawk Lake Dam is located in Seismic Zone 1 as defined in "Recommended Guidelines for Safety Inspection of Dam" which is a zone of very low seismic activity. Experience indicates that dams in seismic Zone 1 will have adequate stability under seismic loading conditions if they have adequate stability under static loading conditions. Upper Mohawk Lake Dam appeared to be outwardly stable under static loading conditions at the time of inspection.

SECTION 7: ASSESSMENT AND RECOMMENDATIONS

7.1 Dam Assessment

a. Safety

Based on hydraulic and hydrologic analyses outlined in Section 5 and Appendix 4, the spillway of Upper Mohawk Lake Dam is assessed as being adequate. The spillway is able to pass the SDF without an overtopping of the dam.

The embankment appeared, at the time of inspection, to be outwardly stable. Observed seepage at the downstream end of the concrete flume was not considered to be evidence of immediate dam instability.

b. *Adequacy of Information*

Information sources for this report include 1) field inspections, 2) USGS quadrangle, 3) consultation with Mr. Frank Tuohey, Manager of the Lake Mohawk Country Club and 4) drawing and correspondence in the files of the Lake Mohawk Country Club. The information obtained is sufficient to allow a Phase I assessment as outlined in "Recommended Guidelines for Safety Inspection of Dams."

Some of the absent data are as follows:

1. As-built drawings.
2. Description of fill material for embankment.
3. Design computations and reports.
4. Maintenance documentation.
5. Soils report for the site.
6. Post construction engineering reports.

c. Necessity for Additional Data/Evaluation

Although some data pertaining to Upper Mohawk Lake Dam are not available, additional data are not considered imperative for this Phase I evaluation.

7.2 Recommendations

a. Remedial Measures

Based on hydraulic and hydrologic analyses outlined in paragraph 5.1.a, the spillway is considered to be adequate.

It is recommended that the following remedial measures be undertaken by the owner in the future.

1) The trash rack at the downstream end of the spillway discharge flume should be reinforced or replaced.

2) Some trees on the embankment appeared to have been planted for aesthetic purposes while others appeared to be randomly located. Therefore, trees on the embankment should be investigated to assess their detrimental effect on the dam and those found to be adverse should be removed.

3) The upstream face and crest of dam should be properly stabilized.

4) The ability to drain the lake should be investigated by an engineer experienced in the design and construction of dams. If the need for a low level outlet is determined, a suitable outlet should be designed and installed.

b. Maintenance

In the future, the owner of the dam should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

c. Additional Studies

The observed seepage should be monitored on a periodic basis by a professional engineer experienced in the design and construction of dams in order to detect any changes in condition.

PLATES

UPPER MOHAWK LAKE DAM

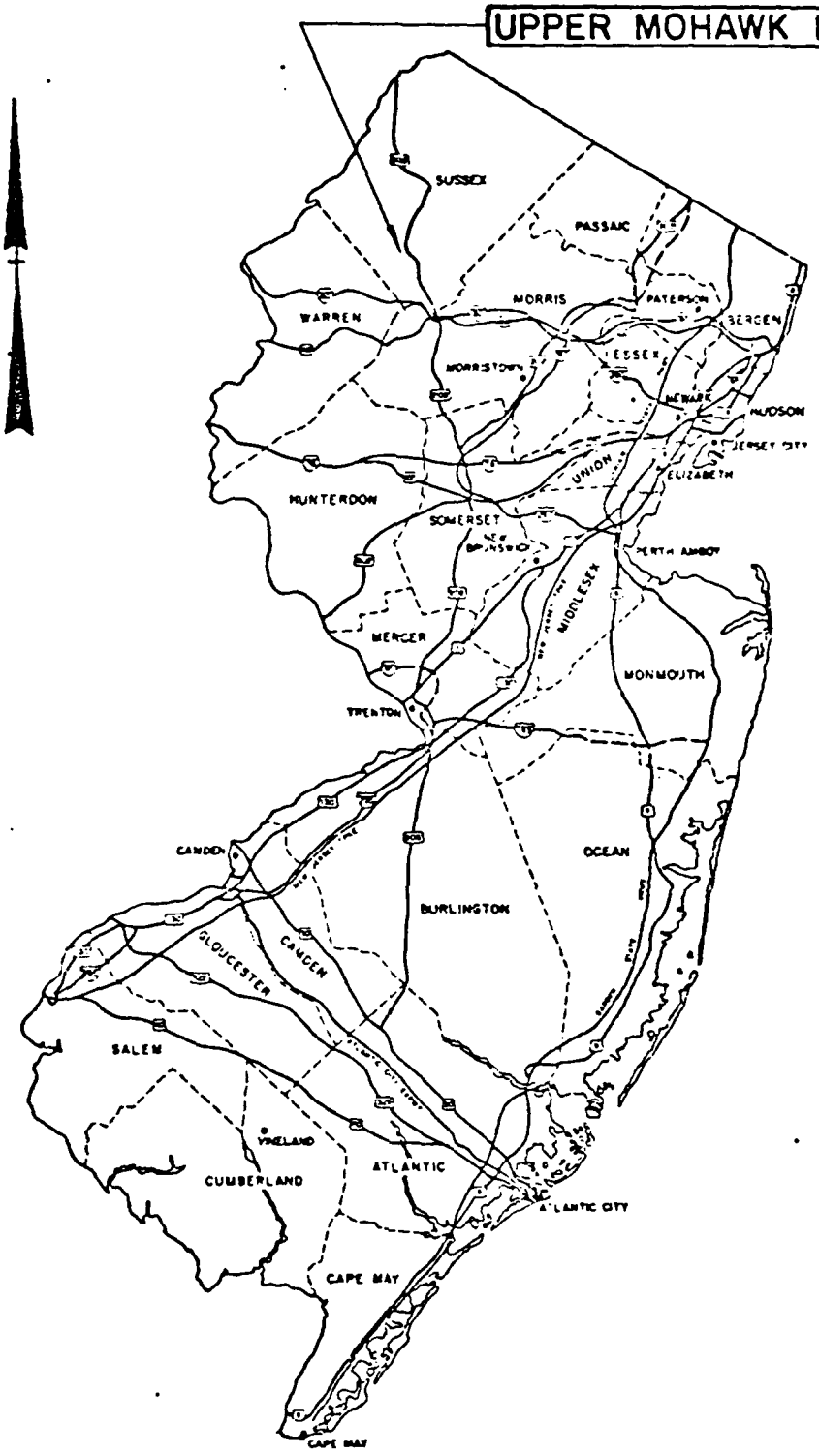
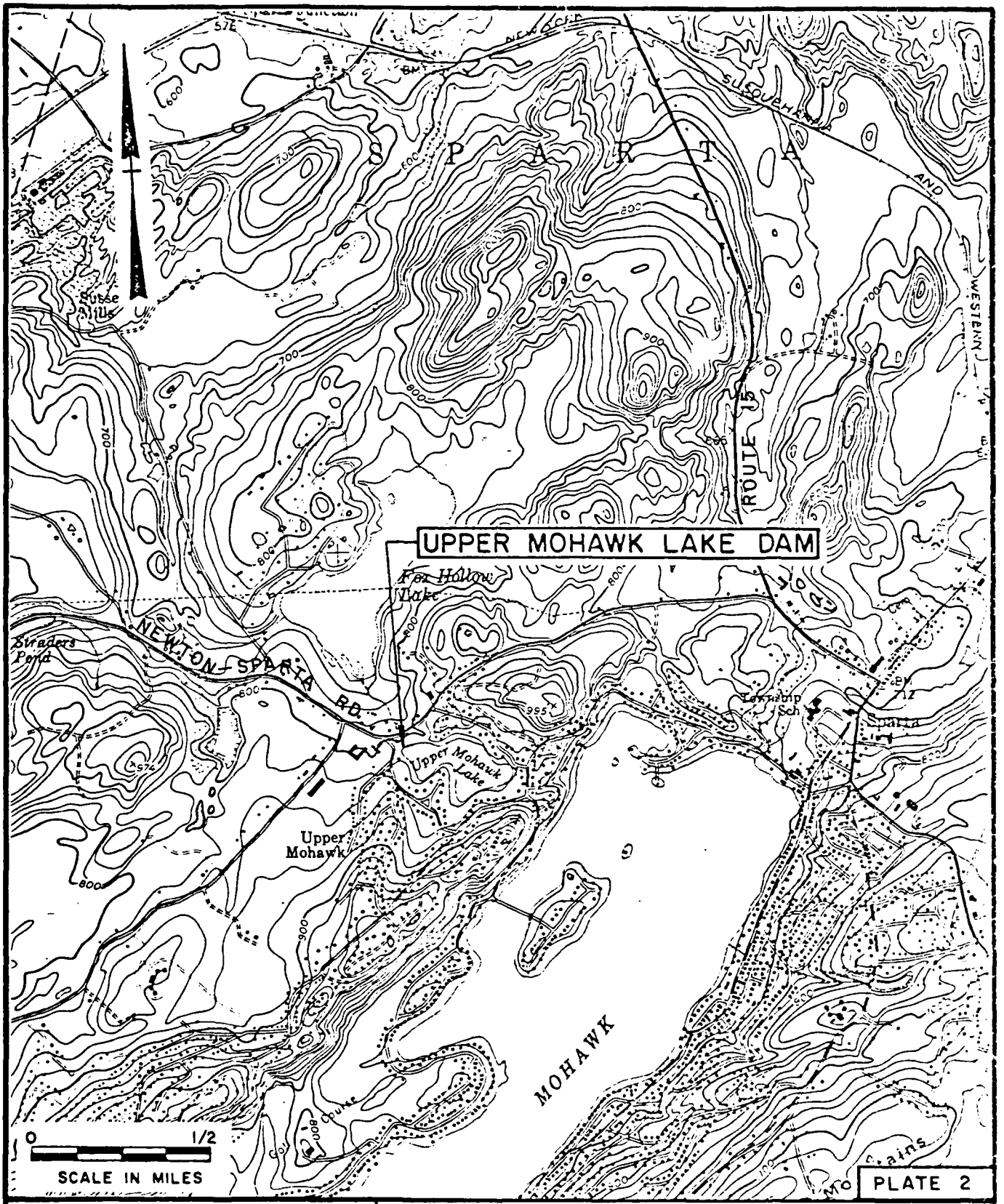


PLATE 1

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	INSPECTION AND EVALUATION OF DAMS KEY MAP UPPER MOHAWK LAKE DAM
DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY	SCALE: NONE DATE: FEB. 1981



STORCH ENGINEERS
FLORHAM PARK, NEW JERSEY

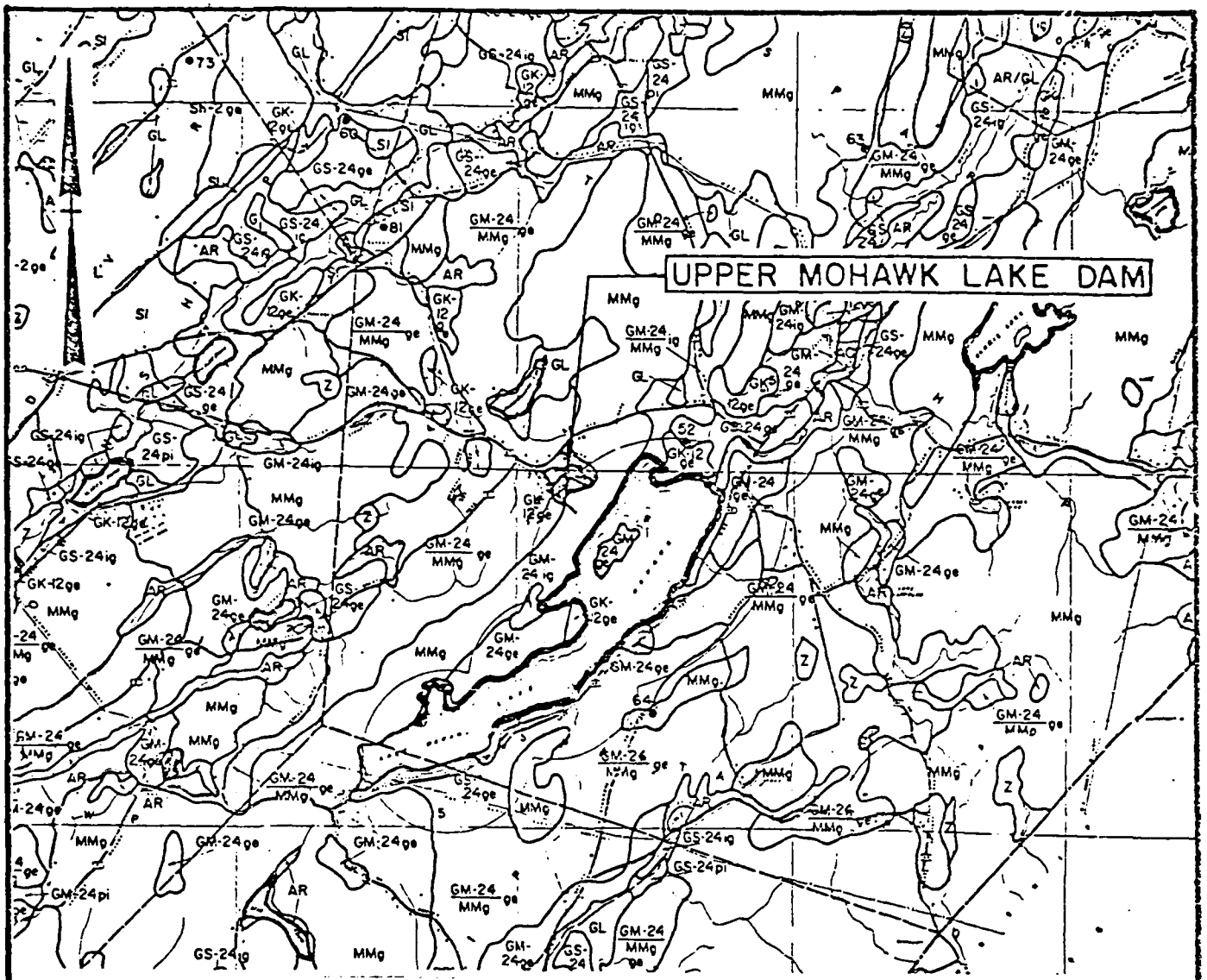
DIVISION OF WATER RESOURCES
N.J. DEPT. OF ENVIR. PROTECTION
TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS

VICINITY MAP

UPPER MOHAWK LAKE DAM

SCALE: AS SHOWN
DATE: FEB. 1981



Legend

GK-12	Glacial kames composed of stratified material deposited during the Wisconsin glacial period.
GM-24/MMg	Shallow mantle of ground moraine. Composed of unconsolidated unstratified materials deposited during the Wisconsin glacial stage overlying Byram gneissic bedrock.
Note:	Information taken from Rutgers University, Soil Survey of New Jersey, Report No. 11, Sussex County, November 1953 and Geologic Map of New Jersey prepared by J.V. Lewis and H. Kummel 1910-1912 revised by H. B. Kummel 1931 and M. Johnson 1950.

PLATE 3

STORCH ENGINEERS
FLORHAM PARK, NEW JERSEY.

DIVISION OF WATER RESOURCES
N.J. DEPT. OF ENVIR. PROTECTION
TRENTON, NEW JERSEY

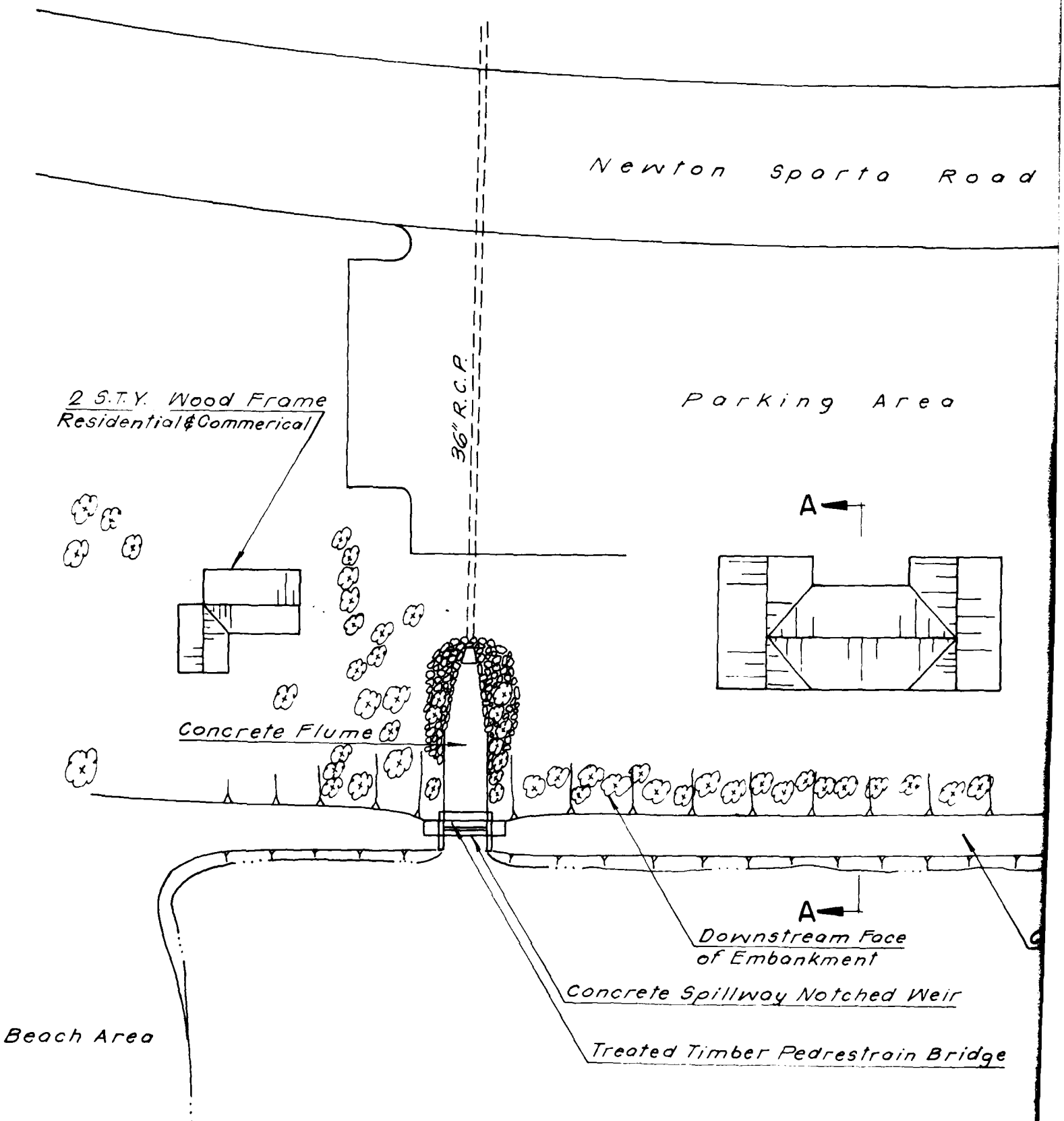
INSPECTION AND EVALUATION OF DAMS

SOIL MAP

UPPER MOHAWK LAKE DAM

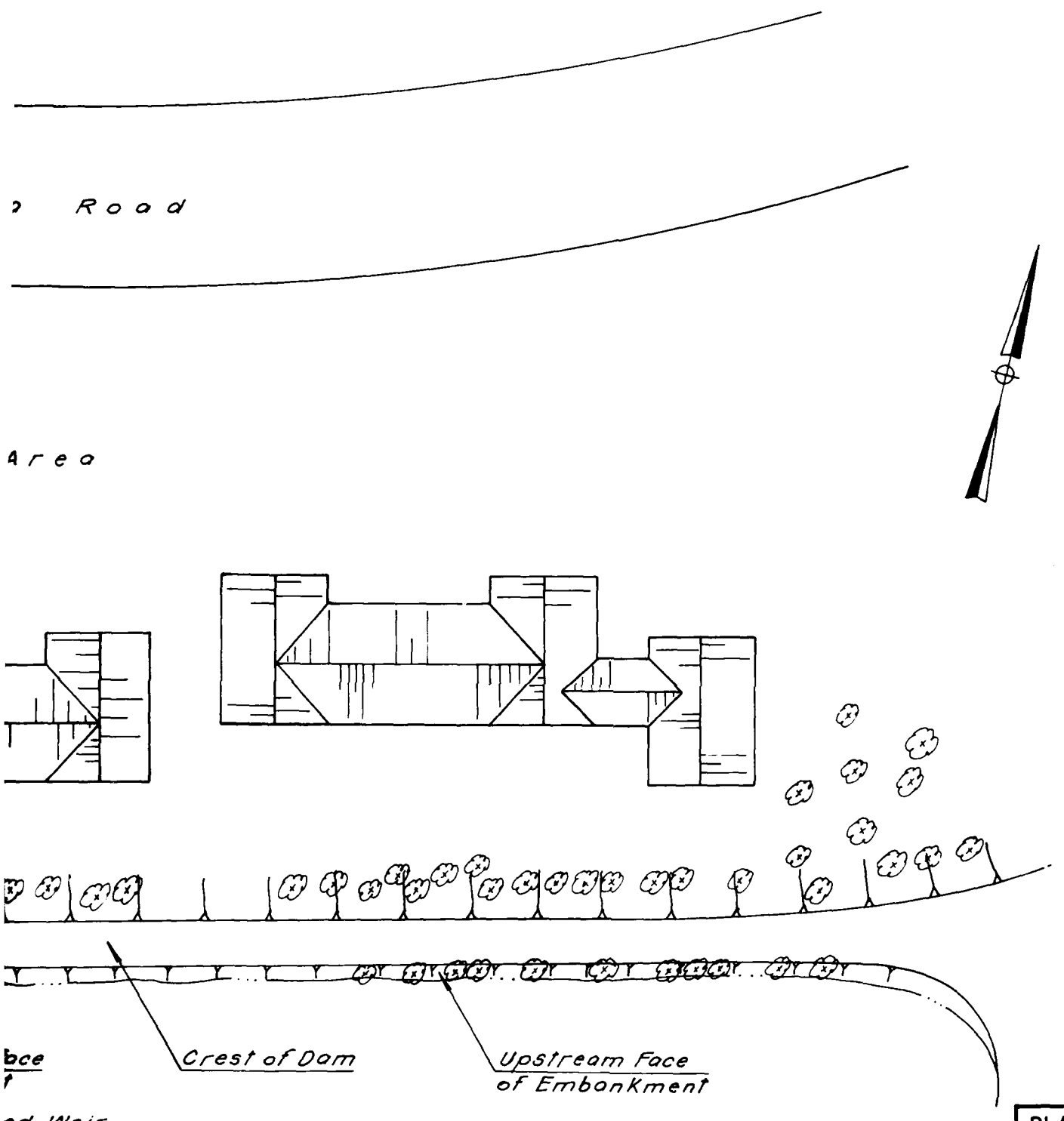
SCALE: NONE

DATE: FEB.1981



Note:
Information taken from drawing titled "Suggested Arrangement of Cutoff Wall" dated Dec 1, 1930 and field Inspection Jan 29, 1981.

UPPER MOHAWK LA



bce

ed Weir

rain Bridge

DHAWK LAKE

PLATE 4

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY

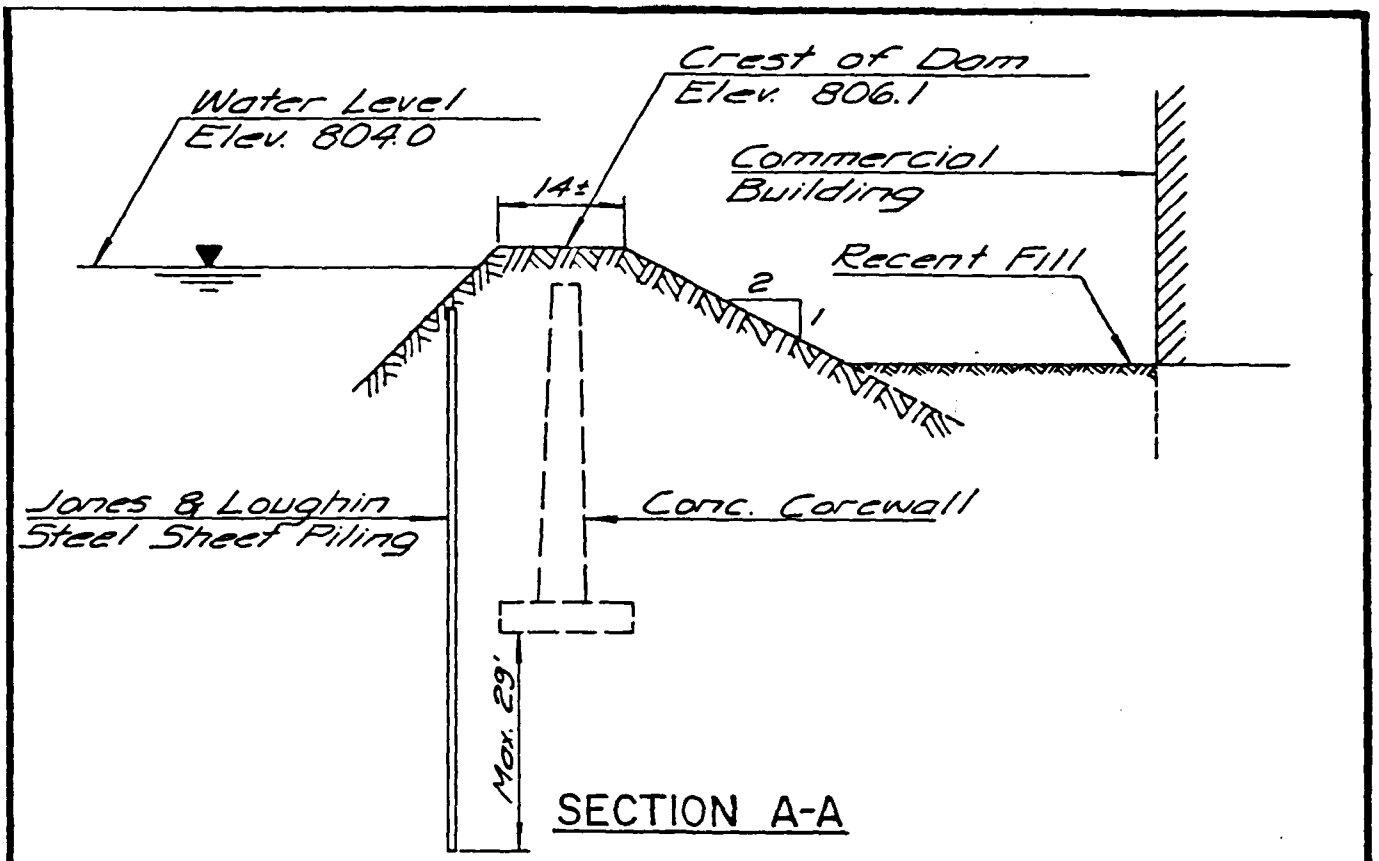
INSPECTION AND EVALUATION OF DAMS

GENERAL PLAN

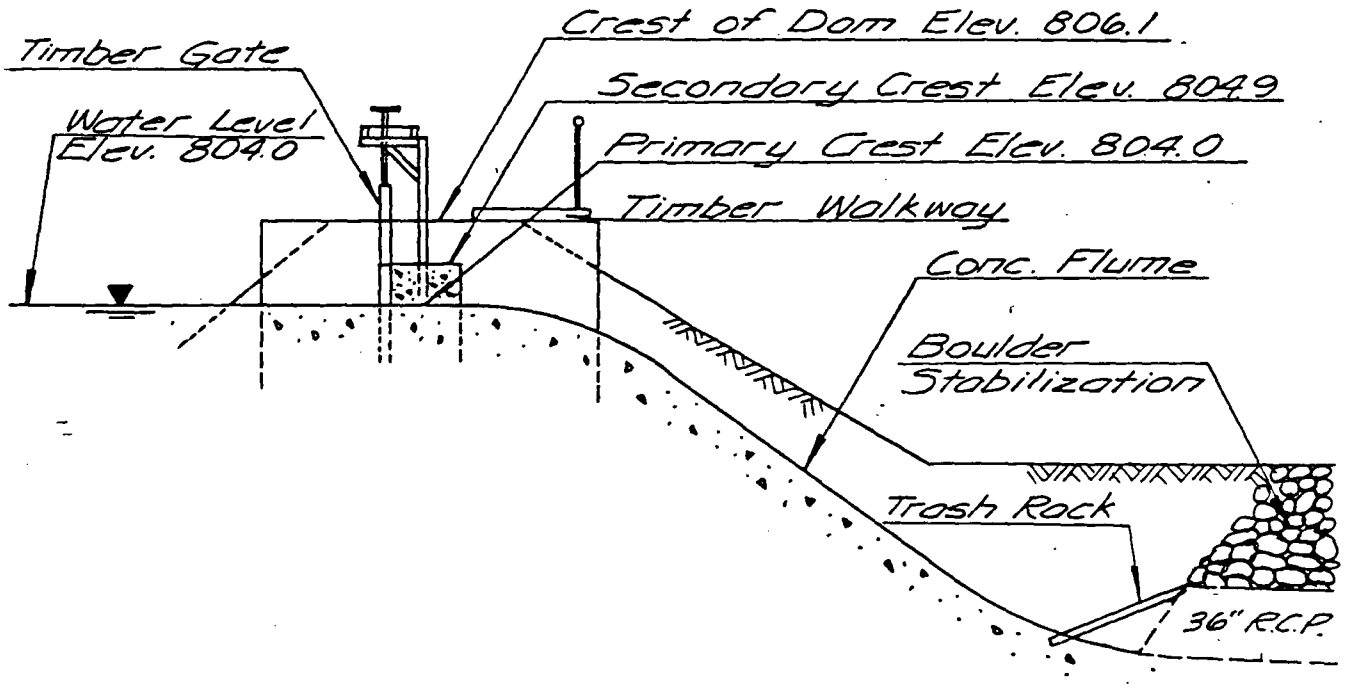
UPPER MOHAWK LAKE DAM

I.D N.J. 00292	SCALE: NOT TO SCALE
	DATE: APRIL, 1981

12



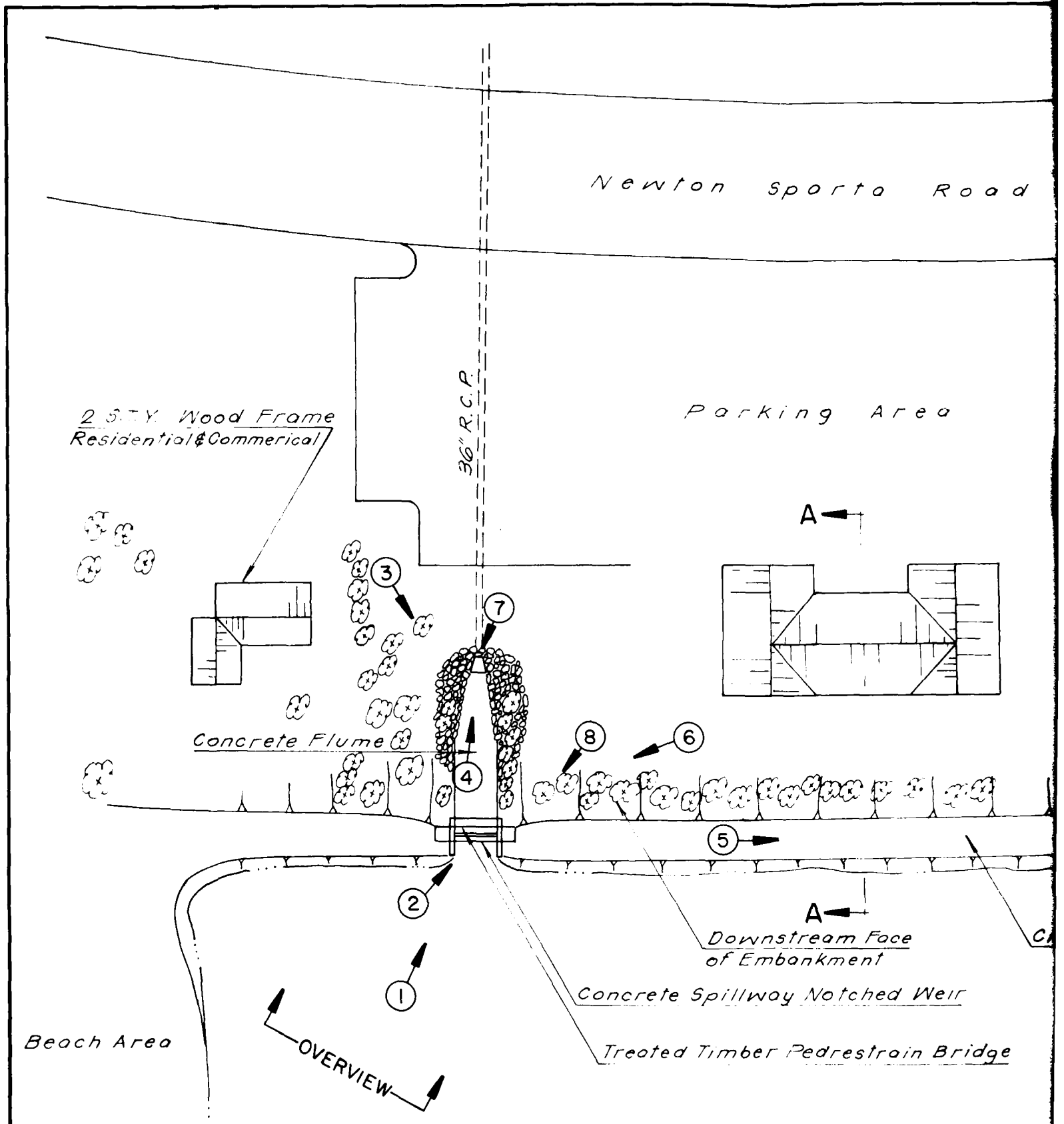
SECTION A-A



SPILLWAY SECTION

PLATE 5

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	INSPECTION AND EVALUATION OF DAMS SECTIONS UPPER MOHAWK LAKE DAM
DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY	I.D. N.J. 00292 / SCALE: NONE DATE: APRIL, 1981

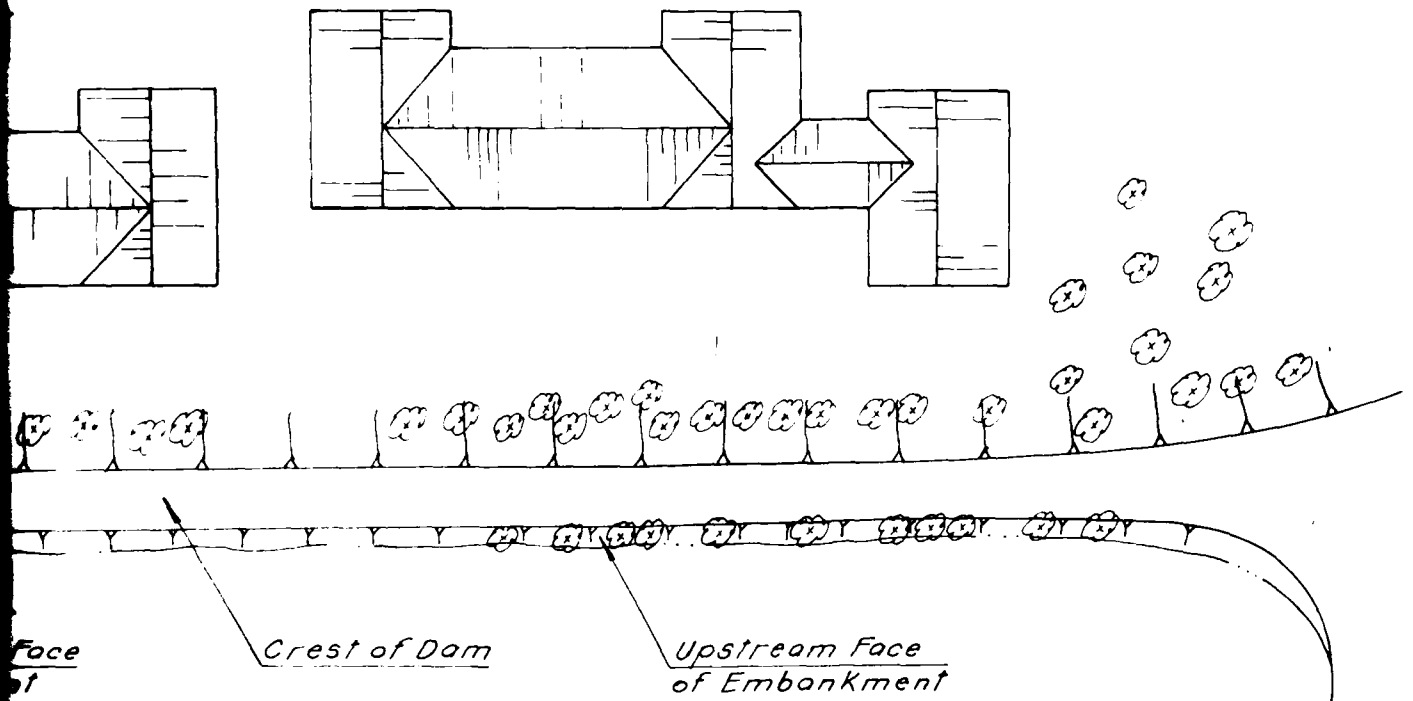


Note
Information taken from drawing titled "Suggested Arrangement of Cutoff Wall" dated Dec 1, 1930 and field inspection Jan 29, 1981

UPPER MOHAWK LAK

o Road

Area



Face
t

ned Weir

Train Bridge

OHAWK LAKE

PLATE 6

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS

PHOTO LOCATION PLAN

UPPER MOHAWK LAKE DAM

ID N.J. 00292	SCALE: NOT TO SCALE
	DATE: APRIL, 1981

APPENDIX 1

Check List - Visual Inspection
Check List - Engineering Data

Check List

Visual Inspection

Phase I

Name of Dam Upper Mohawk Lake Dam County Sussex State N.J. Coordinators NJDEP

Date(s) Inspection 1/29/81 Weather P. Sunny Temperature 20°F.

Pool Elevation at time of Inspection 804.0 M.S.L. Tailwater at Time of Inspection 789.8 M.S.L.

Inspection Personnel:

John Gribbin Richard McDermott

Daniel Buckelew

John Powanda

John Gribbin Recorder

Owner's representative not present

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
GENERAL	Trees located on upstream and downstream sides, sizes 8" to 18". Crest sandy and grass covered with pedestrian path along center. Portion of upstream face stabilized by logs - stabilization in deteriorated condition.	Trees should be removed. Embankment surfaces should be properly stabilized. Since height of dam (from crest to toe) is only 2 or 3 feet in some areas, perhaps these trees should be left in place.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Appeared sound.	
ANY NOTICEABLE SEEPAGE	Orange deposits noted at toe, or downstream end of spillway flume. Seepage flowing with trickle observed flowing from crack in concrete at that location. Also, orange deposits noted in downstream channel about 200' from dam.	
STAFF GAGE AND RECORDER	None observed.	
DRAINS	None observed.	

EMBANKMENT

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Area of erosion noted on downstream face right of spillway - erosion appeared to be due to pedestrain activity.	Eroded area should be repaired.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Vertical : level. Horizontal : straight.	
RIPRAP	Some riprap observed on upstream face. Riprap appeared insufficient for proper slope protection.	Upstream face of dam should be properly stabilized.

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SURFACES IN OUTLET CONDUIT	N.A.	No outlet observed.
INTAKE STRUCTURE	N.A.	
OUTLET STRUCTURE	N.A.	
OUTLET CHANNEL	N.A.	
GATE AND GATE HOUSING	N.A.	

SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
WEIR	Concrete surfaces of weir and abutments in satisfactory condition.	
WALKWAY	Timber walkway in fair condition. Steel pipe railing on walkway in satisfactory condition.	
GATE	Timber gate in satisfactory condition. Steel frame and lifting mechanism protected by paint and in satisfactory condition.	
DISCHARGE FLUME	Flume formed on downstream side of dam in generally satisfactory condition. However, some cracks observed and surface formed somewhat irregularly.	
DISCHARGE CULVERT	Entrance to concrete culvert at toe of flume formed by flared end section in satisfactory condition. Trash rack composed of steel pipes set in concrete. Pipes appeared to be insufficiently embedded. Slope around entrance protected by boulders. Slope protection appeared satisfactory.	Trash rack should be reinforced or replaced.

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None observed.	
OBSERVATION WELLS	None observed.	
WEIRS	None observed.	
PIEZOMETERS	None observed.	
OTHER		

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Shore slopes generally steep and wooded with rock outcrops - slopes about 25% to 50%.	
SEDIMENTATION	Unknown.	
STRUCTURES ALONG BANKS	Homesites located around lake. Most have lake related structures, such as walls and docks. Beach area observed near left end of dam. Dwelling located adjacent to left end of dam.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTION, DEBRIS, ETC.)	Spillway discharge into concrete culvert under a parking area (under construction) and a paved road (Newton - Sparta Road). Downstream from culvert, channel consists of natural stream about 4' wide with 3' high banks. Small pond located about 50' downstream from end of culvert.	
SLOPES	Slopes adjacent to channel generally grass covered with moderate grades.	
STRUCTURES ALONG BANKS	Dwelling located about 100' left of channel downstream from roadway (Newton - Sparta Road), which is located about 100' downstream from dam. Commercial building under construction along toe of dam.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM			REMARKS
DAM	-	PLAN	Construction drawing dated December 1, 1930 available at Lake Mohawk Country Club, 21 The Boardwalk, Sparta, N.J. 07871.
		SECTIONS	
SPILLWAY	-	PLAN	Not Available
		SECTIONS	
		DETAILS	
OPERATING EQUIPMENT PLANS & DETAILS			Not Available
OUTLETS	-	PLAN	Not Available
		DETAILS	
		CONSTRAINTS	
		DISCHARGE RATINGS	
HYDRAULIC/HYDROLOGIC DATA			Not Available
RAINFALL/RESERVOIR RECORDS			Not Available
CONSTRUCTION HISTORY			Available in files of Lake Mohawk Country Club.
LOCATION MAP			Available in files of Lake Mohawk Country Club.

ITEM	REMARKS
DESIGN REPORTS	Not Available
GEOLOGY REPORTS	Not Available
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM INSTABILITY SEEPAGE STUDIES	Not Available
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Not Available
POST-CONSTRUCTION SURVEYS OF DAM	Not Available
BORROW SOURCES	Not Available

ITEM	REMARKS
MONITORING SYSTEMS	Not Available
MODIFICATIONS	Not Available
HIGH POOL RECORDS	Not Available
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	Site Plan for Office Complex adjacent to dam, titled "Upper Lake Plaza" prepared by Architecture Partnership for W. Richard Wilson Jr., dated March 6, 1981 available at Architecture Partnership, 14 Winona Parkway, Sparta, N.J. 07871.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	Not Available
MAINTENANCE OPERATION RECORDS	Not Available

APPENDIX 2

Photographs

PHOTO 1
UPSTREAM VIEW OF SPILLWAY

PHOTO 2
SPILLWAY WEIR AND GATE

UPPER MOHAWK LAKE DAM
29 JANUARY 1981

PHOTO 3
SPILLWAY DISCHARGE FLUME

PHOTO 4
CULVERT INTAKE AND RIPRAP AT DOWNSTREAM END OF FLUME

UPPER MOHAWK LAKE DAM
29 JANUARY 1981

PHOTO 5
CREST OF DAM

PHOTO 6
DOWNSTREAM SIDE OF DAM

UPPER MOHAWK LAKE DAM
29 JANUARY 1981

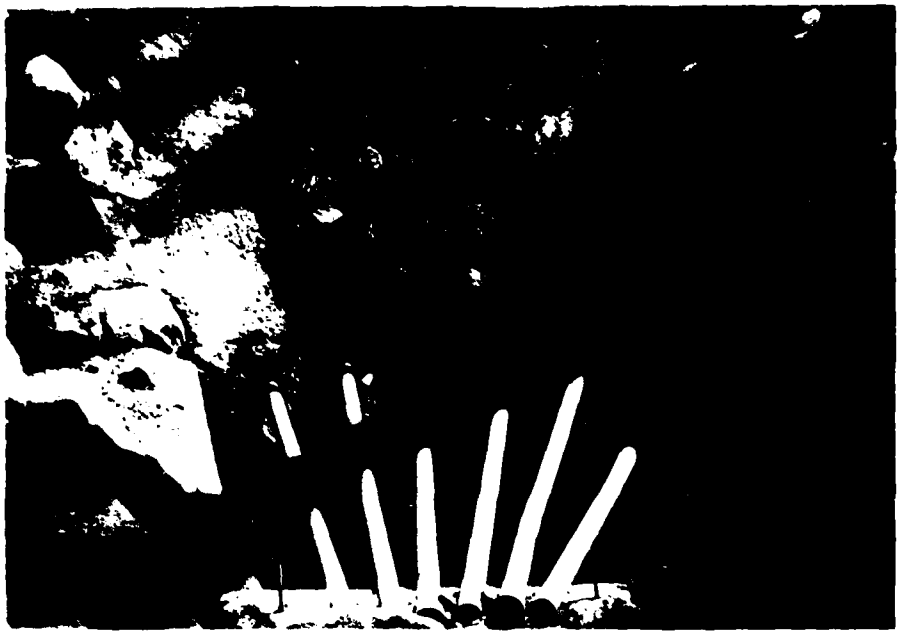


PHOTO 7
EVIDENCE OF SEEPAGE AT DOWNSTREAM
END OF SPILLWAY DISCHARGE FLUME

PHOTO 8
ERODED AREA ON DOWNSTREAM FACE OF DAM AND FILL
RECENTLY PLACED AT TOE

UPPER MOHAWK LAKE DAM
29 JANUARY 1981

APPENDIX 3

Engineering Data

CHECK LIST

HYDROLOGIC AND HYDRAULIC DATA

ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Lake community development

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 804.0 (100 acre feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): N.A.

ELEVATION MAXIMUM DESIGN POOL: 805.7

ELEVATION TOP DAM: 806.1

SPILLWAY CREST:

a. Elevation 804.0 (Primary), 804.9 (Secondary)

b. Type Broad crested weir

c. Width 1.5'

d. Length 4.3' (Primary), 11.0' (Secondary)

e. Location Spillover Center of dam section

f. Number and Type of Gates One timber slide gate 4.3' long

OUTLET WORKS: None

a. Type N.A.

b. Location N.A.

c. Entrance Invert N.A.

d. Exit Invert N.A.

e. Emergency Draindown Facilities: N.A.

HYDOMETEOROLOGICAL GAGES: None

a. Type N.A.

b. Location N.A.

c. Records N.A.

MAXIMUM NON-DAMAGING DISCHARGE:

(Lake Stage Equal to Top of Dam) 55 c.f.s

APPENDIX 4

Hydraulic/Hydrologic Computations

STORCH ENGINEERS

Project Upper Mohawk Lake Dam Made By JLP Date 3-16-81

Sheet 1 of 9

Chkd By JG Date 4/10/81

Hydrology

HYDROLOGIC ANALYSIS - RUNOFF HYDROGRAPH WILL BE DEVELOPED BY THE HEC-1-DAM COMPUTER PROGRAM USING THE SCS TRIANGULAR HYDROGRAPH WITH CURVILINEAR TRANSFORMATION.

DRAINAGE AREA = 0.19 SQ. MI.

INFILTRATION DATA

INITIAL INFILTRATION - 1.5 inches

CONSTANT INFILTRATION 0.15 inches/hour

TIME OF CONCENTRATION

1) SCS-TR55

OVERLAND FLOW:

L = 2500'
Δ ELEV. = 160'
S = 6.4%
V = 0.65 f.p.s.
T_c = 1.07 Hr.

TIME OF CONCENTRATION (con't.)

SCS-TR55

CHANNEL FLOW: NEGLECT

$T_c = 1.07$ HR.

2) BY KERBY HANDBOOK OF HYDROLOGY BY CHOW

$$T_c^{2.14} = 2/3 \, LN / \sqrt{S}$$

where: T_c = Overland time of concentration (min)
L = length of overland flow (ft)
n = Mannings Coeff. ($n = 0.40$)
S = Slope (ft./ft.)

$$T_c^{2.14} = \frac{2/3\,(2500)(0.40)}{\sqrt{0.064}} = 0.66 \text{ HR.}$$

3.) N.J. HIGHWAY AUTHORITY NOMOGRAPH

OVERLAND FLOW:

$L = 2500'$
$S = 0.064$
Avg. Grass
$T_c = 0.62$ HR

TIME OF CONCENTRATION (cont.)

4) S.C.S. NOMOGRAPH - DESIGN OF SMALL DAMS
U.S. DEPT. OF INTERIOR
p. 71.

$$T_c = \left(\frac{11.9\ L^3}{H}\right)^{0.385}$$

OVERLAND FLOW:

L = 2500'
H = 160'
T_c = 0.15 HR.

5) TEXAS HIGHWAY DEPT. DESIGN OF SMALL DAMS
U.S. DEPT. OF INTERIOR p. 70.

OVERLAND FLOW:

L = 2500'
S = 6.4 %
V = 3.0 f.p.s.
T_c = 0.23 HR.

FOR COMPUTER USE INPUT

LAG TIME USE T_c = 0.70 HR
60% T_c = LAG = 0.42 HR

STORCH ENGINEERS

Sheet 4 of 9

Project UPPER MOHAWK LAKE DAM Made By JLP Date 3-16-81

Chkd By JG Date 4/10/81

LAKE STORAGE VOLUME

WATER SURFACE ELEVATION	AREA (ACRES)
789	0
804	20.0
820	23.42
840	55.56
860	69.79

HEC-1-DAM COMPUTER PROGRAM WILL DEVELOP STORAGE CAPACITY FROM SURFACE AREAS AND ELEVATIONS TAKEN FROM USGS QUADRANGE NEWTON EAST, N.J.

PRECIPITATION

24 HOUR, 100 YEAR RAINSTORM DISTRIBUTION FOR UPPER MOHAWK LAKE DAM.

TIME (HR.)	RAIN (inches)
1	0.075
2	0.075
3	0.075
4	0.075
5	0.075
6	0.075
7	0.075
8	0.075
9	0.075
10	0.075
11	0.075
12	0.075
13	0.15
14	0.15
15	0.15
16	0.33
17	0.65
18	3.00
19	0.65
20	0.33
21	0.33
22	0.15
23	0.15
24	0.15
	7.09 inches

HYDRAULICS

THE SPILLWAY AT UPPER MOHAWK LAKE DAM CONSISTS OF A 2 STAGE CONCRETE WEIR WITH A TIMBER SLIDE GATE FITTED IN THE NOTCH COMPRISING THE PRIMARY STAGE. THE SPILLWAY DISCHARGES ONTO A CONCRETE FLUME AND THEN INTO A 36" R.C.P. FOR THE WEIR, DISCHARGE Q, CAN BE CALCULATED BY:

$$Q = C L h^{3/2}$$

where:
- Q = discharge over spillway
- C = discharge coefficient
- L = effective length of spillway
- h = total head on spillway.

VALUES FOR THE DISCHARGE COEFFICIENT, "C" WERE TAKEN FROM THE "HANDBOOK OF HYDRAULICS" BY KING & BRATER.

WHEN LAKE LEVEL REACHES THE BOTTOM OF THE SLIDE GATE, Q FOR THE PRIMARY SPILLWAY STAGE CAN BE CALCULATED BY THE ORIFICE FORMULA.

$$Q = 0.6 A \sqrt{2gh}$$

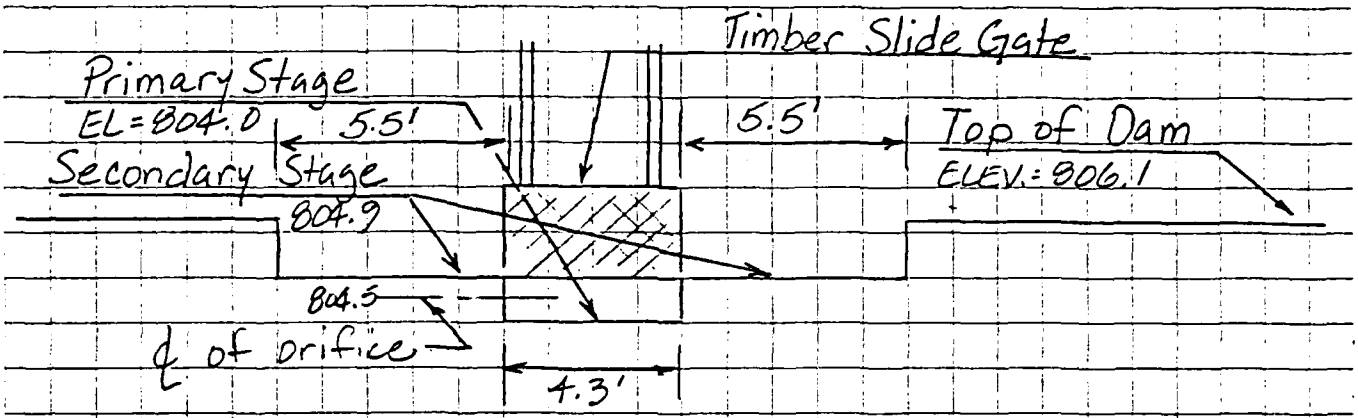
STORCH ENGINEERS

Project Upper Mohawk Lake Dam

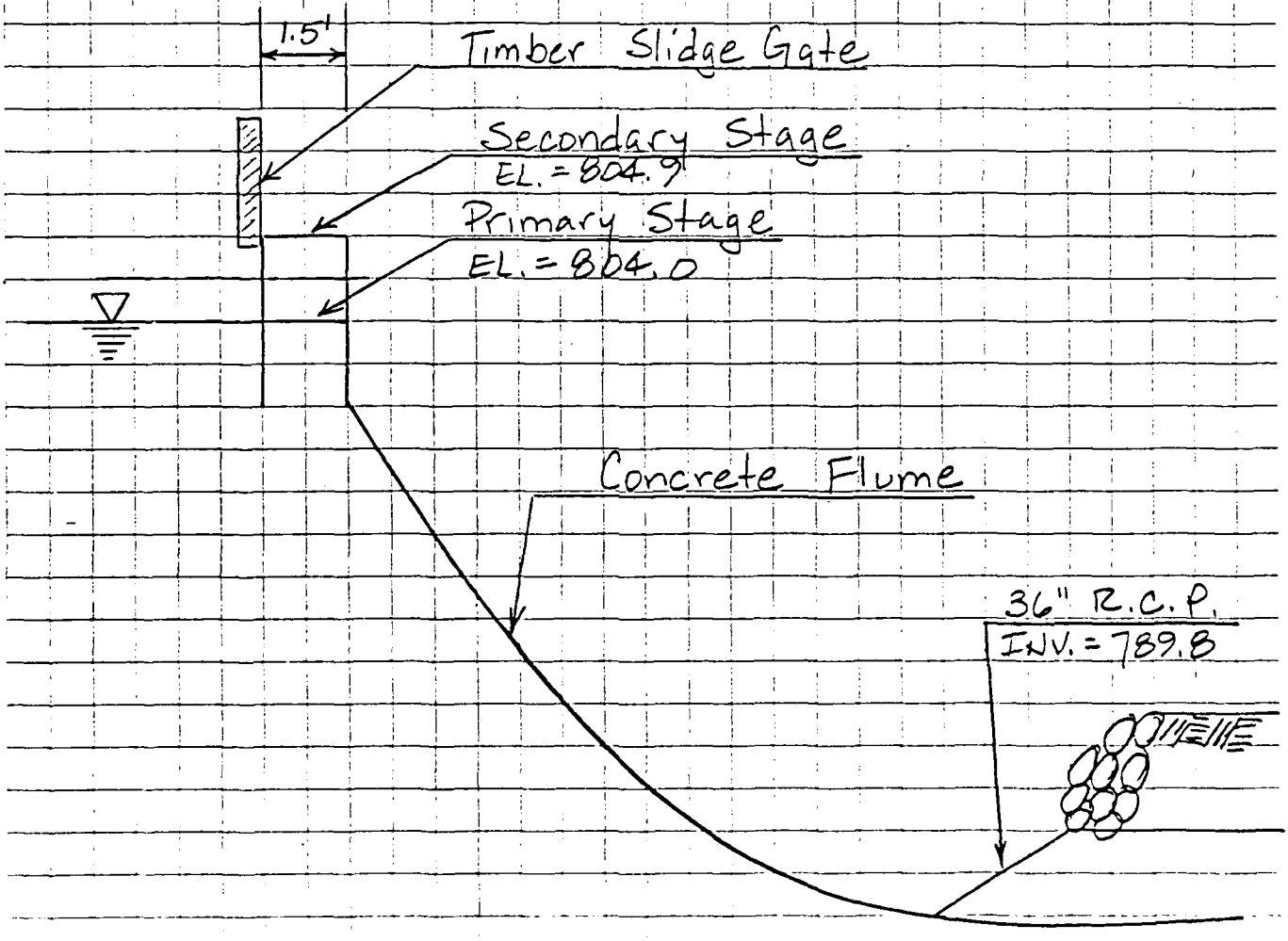
Sheet 7 of 9

Made By JLP Date 3-20-81

Chkd By JG Date 4/10/81



SPILLWAY ELEVATION



SPILLWAY SECTION

STORCH ENGINEERS

Project Upper Mohawk Lake Dam Made By JLP Date 3-24-81 Sheet 8 of 9

Chkd By JG Date 4/10/81

SPILLWAY STAGE DISCHARGE TABULATION

	PRIMARY SPILLWAY								SECONDARY SPILLWAY				
	WEIR FLOW				ORIFICE FLOW				WEIR FLOW				
ELEV.	C	L (ft)	H (ft)	Q (cfs)	A (ft^2)	$2g$	H (ft)	Q (cfs)	C	L (ft)	H (ft)	Q (cfs)	Tot. Q (cfs)
804.0													0.0
304.5	2.64	4.3	0.5	4.0									4.0
304.9	2.75	4.3	0.9	10.1									10.1
306.1					3.87	64.4	11.6	23.6	2.86	11.0	1.2	41.4	65.0
307.0					3.87	64.4	2.5	29.5	3.03	11.0	2.1	101.4	130.9
308.0					3.87	64.4	3.5	34.9	3.32	11.0	3.1	199.3	234.2
309.0					3.87	64.4	4.5	39.5	3.32	11.0	4.1	303.2	342.7
310.0					3.87	64.4	5.5	43.7	3.32	11.0	5.1	420.6	464.3
312.0					3.87	64.4	7.5	51.0	3.32	11.0	7.1	690.9	741.9
314.0					3.87	64.4	9.5	57.4	3.32	11.0	9.1	1002.5	1059.9

STORCH ENGINEERS

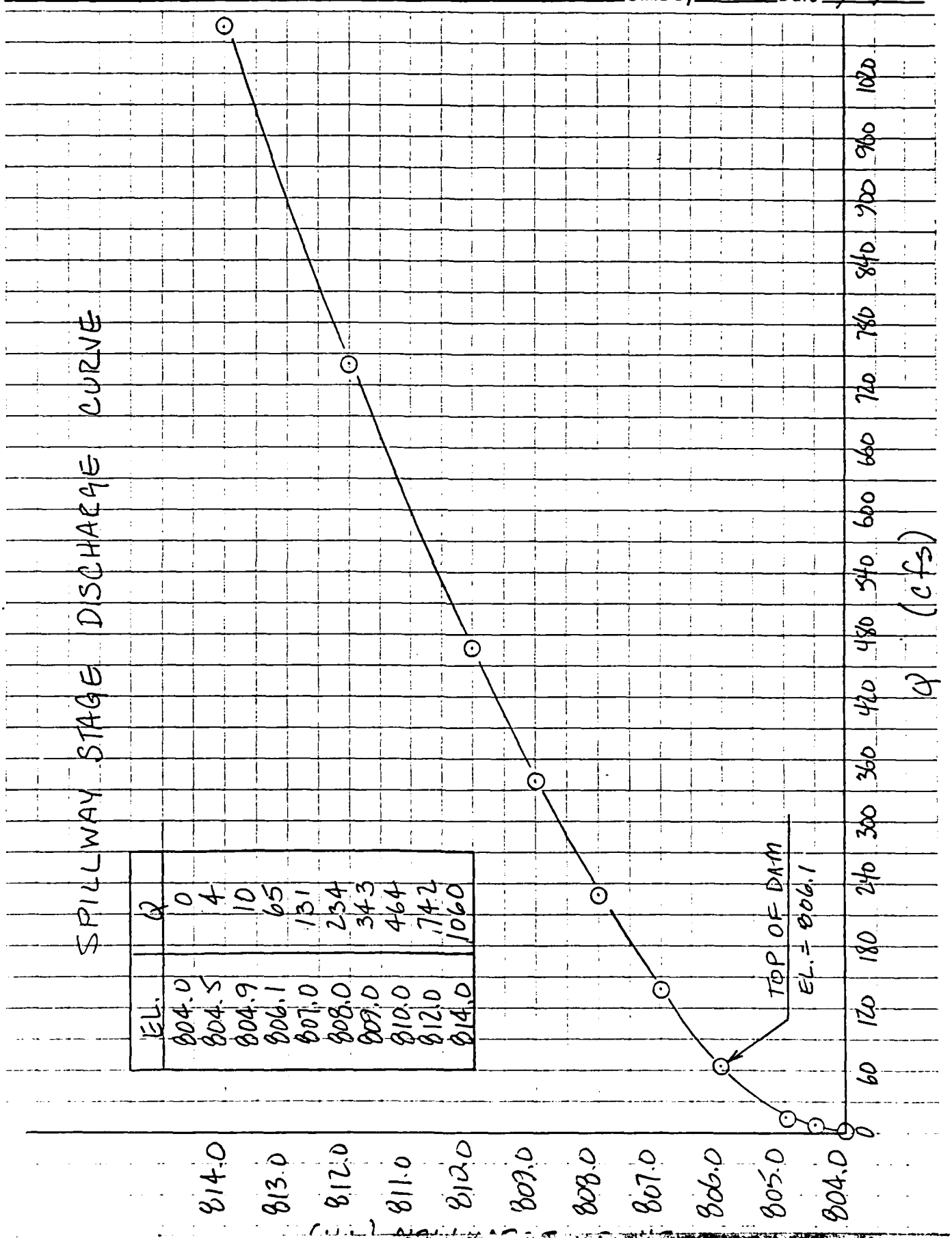
Sheet 9 of 9

Project Upper Mohawk Lake Dam Made By JLP Date 3-21-81

Chkd By JG Date 4/10/81

SPILLWAY STAGE DISCHARGE CURVE

EL.	Q
804.0	0
804.5	4
804.9	10
806.1	65
807.0	131
808.0	234
809.0	343
810.0	464
812.0	742
814.0	1060



HEC - 1 - DAM PRINTOUT

Overtopping Analysis

```
1A1                          NATIONAL DAM SAFETY PROGRAM
A2                           UPPER MOHAWK LAKE DAM, NEW JERSEY
A3                           100 YEAR STORM ROUTING
B     300       0      15                                  0       0       4
B1      5
J       1       1       1
J1      1
K       0    LAKE                          0       0       1
K1         INFLOW HYDROGRAPH TO UPPER MOHAWK LAKE DAM
M       0       2    0.19              0.19       0                       1
O      96
O1 0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019
O1 0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019
O1 0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019
O1 0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019
O1 0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.038
O1 0.038   0.038   0.038   0.038   0.038   0.038   0.038   0.038   0.038   0.038
O1 0.083   0.083   0.083   0.083   0.163   0.163   0.163   0.163   0.750   0.750
O1 0.750   0.750   0.163   0.163   0.163   0.163   0.083   0.083   0.083   0.083
O1 0.083   0.083   0.083   0.083   0.038   0.038   0.038   0.038   0.038   0.038
O1 0.038   0.038   0.038   0.038   0.038   0.038
T                                                   1.5     0.15
W2             0.42
X    -1.0    -0.05     2.0
K       1     DAM
K1          ROUTE DISCHARGE THROUGH DAM
Y                                       1       1
Y1      1                                               -804.0      -1
Y4  804.0   804.5   804.9   806.1   807.0   808.0   809.0   810.0   812.0   814.0
Y5      0       4      10      65     131     234     343     464     742    1060
$A      0    20.0   23.42   55.56   69.79
$E    789     804     820     840     860
$$  804.0
$D  806.1    2.63     1.5     440
K       1       1                                               1
K1         CHANNEL ROUTING REACH 1
Y                                       1       1
Y1      1
Y6    0.1   0.035     0.1     792     805     350   0.031
Y7      0     805     250   800.6     500     796     505     792     510     792
Y7    515     796     700     798     250     805
K      99
```

NATIONAL DAM SAFETY PROGRAM
UPPER MOHAWK LAKE DAM, NEW JERSEY
100-YEAR-STORM-ROUTING

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	15	0	0	0	0	0	4	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 1 LRTIO= 1
RTIOS= 1.00

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH TO UPPER MOHAWK LAKE DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
LAKE	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
0	2	.19	0.00	.19	0.00	0.000	0	1	0

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSNX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.50	.15	0.00	0.00

UNIT HYDROGRAPH DATA
TC= 0.00 LAG= .42

RECESSION DATA
STRTQ= -1.00 QRCSN= -.05 RTIOR= 2.00

0
END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	7.12	4.33	2.79	2322.
										(181)	(110.)	(71.)	(65.75)

NATIONAL DAM SAFETY PROGRAM
UPPER MOHAWK LAKE DAM, NEW JERSEY
100 YEAR STORM ROUTING

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	JPLT	JPRT	NSTAN
300	0	15	0	0	0	0	0	4	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 1 LRTIO= 1

RTIOS= 1.00

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH TO UPPER MOHAWK LAKE DAM

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
LAKE	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
0	2	.19	0.00	.19	0.00	0.000	0	1	0

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.50	.15	0.00	0.00

UNIT HYDROGRAPH DATA
TC= 0.00 LAG= .42

RECESSION DATA
STRTQ= -1.00 QRCSN= -.05 RTIOR= 2.00

0
END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	7.12	4.33	2.79	2322.
										(181.)	(110.)	(71.)	(65.75)

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTE DISCHARGE THROUGH DAM

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
DAM	1	0	0	0	0	0	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-804.	-1

STAGE	804.00	804.50	804.90	806.10	807.00	808.00	809.00	810.00	812.00	814.00
FLOW	0.00	4.00	10.00	65.00	131.00	234.00	343.00	464.00	742.00	1060.00
SURFACE AREA=	0.	20.	23.	56.	70.					
CAPACITY=	0.	100.	447.	1214.	2465.					
ELEVATION=	789.	804.	820.	840.	860.					

CREL	SPWID	COOW	EXPW	ELEVL	COOL	CAREA	EXPL
804.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
806.1	2.6	1.5	440.

PEAK OUTFLOW IS 47. AT TIME 19.50 HOURS

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1
				1.00
HYDROGRAPH AT	LAKE	.19	1	316.
		(.49)		(8.94)
ROUTED TO	DAM	.19	1	47.
		(.49)		(1.32)
ROUTED TO	1	.19	1	47.
		(.49)		(1.33)

1 SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	804.00	804.00	806.10
	STORAGE	100.	100.	142.
	OUTFLOW	0.	0.	65.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	805.70	0.00	134.	47.	0.00	19.50	0.00

PLAN 1 STATION 1

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	47.	793.1	19.50

HEC - 1 - DAM PRINTOUT

Breach Analysis

```
1A1                          NATIONAL DAM SAFETY PROGRAM
A2                           UPPER MOHAWK LAKE DAM, NEW JERSEY
A3                           100 YEAR STORM ROUTING
B     300        0       15                              0       0       4
B1        5
J       1        1       1
J1      1
K       0     LAKE                              0       0       1
K1          INFLOW HYDROGRAPH TO UPPER MOHAWK LAKE DAM
M       0        2    0.19              0.19       0                       1
O        96
O1  0.019    0.019    0.019    0.019    0.019    0.019    0.019    0.019    0.019    0.019
O1  0.019    0.019    0.019    0.019    0.019    0.019    0.019    0.019    0.019    0.019
O1  0.019    0.019    0.019    0.019    0.019    0.019    0.019    0.019    0.019    0.019
O1  0.019    0.019    0.019    0.019    0.019    0.019    0.019    0.019    0.019    0.019
O1  0.019    0.019    0.019    0.019    0.019    0.019    0.019    0.019    0.038    0.038
O1  0.038    0.038    0.038    0.038    0.038    0.038    0.038    0.038    0.038    0.038
O1  0.083    0.083    0.083    0.083    0.163    0.163    0.163    0.163    0.750    0.750
O1  0.750    0.750    0.163    0.163    0.163    0.163    0.083    0.083    0.083    0.083
O1  0.083    0.083    0.083    0.083    0.038    0.038    0.038    0.038    0.038    0.038
O1  0.038    0.038    0.038    0.038    0.038    0.038
T                                                        1.5     0.15
W2          0.42
X    -1.0    -0.05      2.0
K       1      DAM
K1          ROUTE DISCHARGE THROUGH DAM
Y                                        1        1
Y1      1                                                -804.0      -1
Y4  804.0    804.5    804.9    806.1    807.0    808.0    809.0    810.0    812.0    814.0
Y5      0        4       10       65      131      234      343      464      742     1060
$A      0     20.0    23.42    55.56    69.79
$E    789      804      820      840      860
$$  804.0
$D  806.1     2.63      1.5      440
$B     25        1      789      1.0     -804    805.6
K       1        1                                        1
K1          CHANNEL ROUTING REACH 1
Y                                        1        1
Y1      1
Y6    0.1    0.035      0.1      792      805      350    0.031
Y7      0      805      250    800.6      500      796      505      792        0      792
Y7    515      796      700      798      750      805
K      99
```

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTE DISCHARGE THROUGH DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
DAM	1	0	0	0	0	0	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-804.	-1

STAGE	804.00	804.50	804.90	806.10	807.00	808.00	809.00	810.00	812.00	814.00
FLOW	0.00	4.00	10.00	65.00	131.00	234.00	343.00	464.00	742.00	1060.00
SURFACE-AREA=	0.	20.	23.	56.	70.					
CAPACITY=	0.	100.	447.	1214.	2465.					
ELEVATION=	789.	804.	820.	840.	860.					

CREL	SPWID	COOW	EXPW	ELEVL	COOL	CAREA	EXPL	
	804.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
806.1	2.6	1.5	440.

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
25.	1.00	789.00	1.00	804.00	805.60

BEGIN DAM FAILURE AT 19.00 HOURS

PEAK OUTFLOW IS 2566. AT TIME 19.83 HOURS

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1
				1.00
HYDROGRAPH AT	LAKE	.19	1	316.
		(.49)		(8.94)(
ROUTED TO	DAM	.19	1	2497.
		(.49)		(70.72)(
ROUTED TO	1	.19	1	2474.
		(.49)		(70.04)(

1 SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	804.00	804.00	806.10
	STORAGE	100.	100.	142.
	OUTFLOW	0.	0.	65.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	805.66	0.00	133.	2566.	0.00	19.83	19.00

PLAN 1 STATION 1

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	2474.	798.2	19.75

APPENDIX 5

Bibliography

1. "Recommended Guidelines for Safety Inspection of Dams," Department of the Army, Office of the Chief of Engineers, Washington, D.C. 20314.

2. Design of Small Dams, Second Edition, United States Department of the Interior, Bureau of Reclamation, United States Government Printing Office, Washington, D.C., 1973.

3. Holman, William W. and Jumikis, Alfreds R., Engineering Soil Survey of New Jersey, Report No. 11, Sussex County, Rutgers University, New Brunswick, N.J. 1953.

4. "Geologic Map of New Jersey, " prepared by J. Volney Lewis and Henry B. Kummel, Dated 1910-1912, revised by H.B. Kummel, 1931 and M. Johnson, 1950.

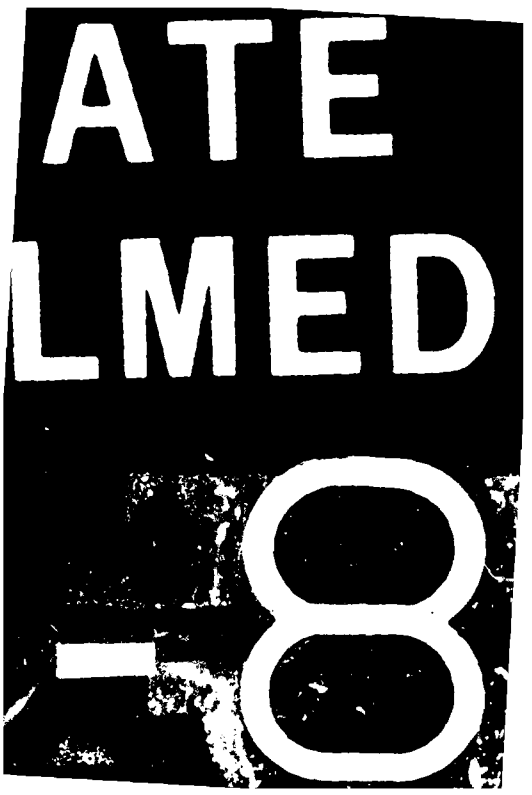
5. Chow, Ven Te., Ed., Handbook of Applied Hydrology, McGraw-Hill Book Company, 1964.

6. Herr, Lester A., Hydraulic Charts for the Selection of Highway Culverts, U.S. Department of Transportation, Federal Highway Administration, 1965.

7. Safety of Small Dams, Proceedings of the Engineering Foundation Conference, American Society of Civil Engineers, 1974.

8. King, Horace Williams and Brater, Ernest F., Handbook of Hydraulics, Fifth Edition, McGraw-Hill Book Company, 1963.

9. Urban Hydrology for Small Watersheds, Technical Release No. 55, Engineering Division, Soil Conservation Service, U.S. Department of Agriculture, January 1975.


ATE
LMED
8